Disturbance of heritage resources.	• All heritage items as identified in the HIA, must be avoided and the line deviated slightly or pylon structures repositioned to avoid negative impact on these heritage items. • A HIA Specialist must be a part of the walk-down survey and clearly demarcated all heritage sites prior to commencmenet of construction. • Should any additional remains and/or artefacts be discovered on the site during earthworks, all work will cease in the area affected and the Contractor will immediately inform the Construction Manager. • Should any heritage resources be exposed during excavation or be found on site, a registered heritage specialist must be called to site for inspection. • Should any heritage resources be exposed during excavation or be found on site, the relevant heritage resource agency (i.e. SAHRA) must be informed about the finding. • Under no circumstances may any heritage material be destroyed or removed from site. • If any heritage structures cannot be avoided the relevant permit must be obtained from the relevant authority to remove the structures. • Should any remains be found on site that is potentially human remains, the South African Police Service should also be contacted.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	–-	local	medium-high	short-term	unlikely	2
After Mitigation	–-	local	low	short-term	unlikely	1

Environmental Feature	**Heritage Resources**
Relevant Alternatives & Activities	**Western alternatives; access roads; construction camps**
Project life-cycle	**Construction phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Disturbance of heritage resources.	• All heritage items as identified in the HIA, must be avoided and the line deviated slightly or pylon structures repositioned to avoid negative impact on these heritage items. • A HIA Specialist must be a part of the walk-down survey and clearly demarcated all heritage sites prior to commencmenet of construction. • Should remains and/or artefacts be discovered on the site during earthworks, all work will cease in the area affected and the Contractor will immediately inform the Construction Manager. • Should any heritage resources be exposed during excavation or be found on site, a registered heritage specialist must be called to site for inspection. • Should any heritage resources be exposed during excavation or be found on site, the relevant heritage resource agency (i.e. SAHRA) must be informed about the finding. • Under no circumstances may any heritage material be destroyed or removed from site. • If any heritage structures cannot be avoided the relevant permit must be obtained from the relevant authority to remove the structures. • Should any remains be found on site that is potentially human remains, the South African Police Service should also be contacted.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance

Before Mitigation	–-	local	medium-high	short-term	unlikely	3
After Mitigation	–-	local	low	short-term	unlikely	2

11.7 Visual Quality

11.7.1 Impact Overview

An extract from the Visual Impact Assessment (Axis Landscape Architecture, 2011) pertaining to the impacts to the visual quality of the project area follows.

11.7.1.1 Significance of Landscape Impacts

Landscape impacts are alterations to the fabric, character, visual quality and/or visual value which will either positively or negatively affect the landscape character. During the construction and operational phases, the project components are expected to impact on the landscape character of the landscape types it traverses.

Construction Phase

The activities that are expected to cause landscape impacts and that are associated with the construction phase, are the establishment of the construction camp, construction of access roads and the clearance of the servitude. These activities will create surface disturbances which will result in the removal of vegetation and the exposure of the underlying soil.

The extent of the disturbances will generally affect a relative small footprint area. Access roads to the towers are expected to be a two-track dirt road which will create the minimum disturbance. During construction, the area around the individual towers will be disturbed.

The construction camp and lay-down yards are anticipated to disturb a much larger area. The size and location of the construction camp will play a major role in the severity of the landscape impact.
Servitudes will generally be cleared of higher growing and dense vegetation to reduce biomass that may cause a fire hazard if ignited.

The presence of the roads, overgrazed fields and mines as well as existing power lines has caused a localised reduction in the visual quality. Areas along the proposed route are occupied by farms and drainage systems as well as rocky outcrops, which increases the quality of the landscape. The VAC between Anderson and Dinaledi Substations is considered Moderate. These factors limit the severity of landscape impact of the proposed alignment to a moderate degree.

Surface disturbances are also minimised through, for example, utilising existing roads. The severity of the landscape impact can however be mitigated to a low severity for the proposed alignment. Sensitive placement of the construction camp, limited surface disturbance and prompt rehabilitation are prerequisite conditions if the severity of impact is to be reduced.

Operational Impacts

Surface disturbances created during construction may remain for an extended period during the operational phase. These are seen as residual affects carried forward from the construction phase and can be completely or substantially mitigated if treated appropriately during the construction phase.

An additional impact will be caused as a result of the presence of the completed transmission line, i.e. that of the evenly spaced towers. The industrial character and the near monumental vertical scale of the towers will severely contrast with the uniform landscape character that prevails through most of the study area.

11.7.1.2 Significance of Visual Impacts

Empirical research indicates that the visibility of a transmission tower, and hence the severity of visual impact, decreases as the distance between the observer and the tower increases. The landscape type, through which the transmission line crosses, can mitigate the severity of visual impact through topographical or vegetative screening. Bishop *et al* (1988) noticed that in some cases the tower may dominate the view for example, silhouetted against the skyline, or in some cases be absorbed in the landscape. A complex landscape setting with a diverse land cover and topographical variation has the ability to decrease the severity of visual impact more than a mundane landscape (Bishop *et al*, 1985).

11.7.1.2.1 Visual Impacts on Residents

Generally, the study area is moderately populated, especially the residential developments and farming communities. These communities are normally situated along main transportation routes or adjacent to rivers or water resources.

Numerous other small villages and residents will experience an intrusion on their view due to the presence of the proposed Transmission line. It is unpractical to discuss all, but they are recognized as the general population of the study area and are identified as affected visual receptors. Some of the residents in the study area are farm residents, which are scattered across the study area. Residents of the affected environment are classified as visual receptors of *high* sensitivity owing to their sustained visual exposure to the proposed development as well as their attentive interest towards their living environment.
Figure 19-25 indicate that due to the scale of the project, the only sections of the proposed power line will be visible throughout of the study area. The topography provides moderate VAC to visually screen the

components of the project and it can therefore be stated that the general visibility of the project will be moderate.

Construction Phase

During the construction phase, unsightly views may be created by the presence of the construction camp and the lay-down yards. The duration of the potential visual impact will be temporary which will result in an anticipated *moderately-low* significance of visual impact for the proposed alignments. The visual exposure to the construction activity will initially be limited and only local farms and informal settlements will experience views of the site preparation activity. As the structures increase in scale and height, the ZVI increases, resulting in a greater number of affected viewers and a subsequent increase in visual exposure.

The visual intrusion will progressively increase in severity as the power line increase in scale. The cleared site, construction camp and material lay-down yards will appear unsightly and out of character. Large scale construction elements such as cranes will be highly visible and increase awareness of the construction activity over a considerable area. The visual intrusion caused during the construction stage will be high, but will be temporary in nature.

Operational Phase

The residents of informal settlements, residential developments and farming communities along the power line may experience a high degree of visual intrusion due to their proximity to the alignment. These residents are within 5 km and in some instances within 1 km from the proposed alignment. This is considered the zone of highest visibility in which the highest degree of visual intrusion can be expected.

The presence of a transmission line in the visual field of the residents in this part of the study area will minimally affect the views they currently experience. The silhouette of a transmission line on the horizon will be visible from a great distance and thus increase the ZVI considerably, potentially impacting on more residents.

11.7.1.2.2 Visual Impact on Tourists

The study area is renowned for its biodiversity and undulating landscapes. These characteristics provide the basis for the tourism industry which plays a major role in the economy of the North West and Gauteng Province. The entire study area is considered to have moderately-high tourism potential.

Construction Phase

The temporary duration of the construction phase is not expected to cause major visual impacts. The location, number and size of the construction camps and lay-down yards will be crucial in regulating the impact. Detail information is not available and it is anticipated that the visual impact will occur localised and that a small number of tourists will be adversely affected by these project components during construction.

The construction camps may however cause a higher visual intrusion on tourists visiting the more scenic, central areas of the study area. Their exposure to possible unsightly views of the construction camps and the associated activity will however be minimal and localised.

The potential visual impact on tourists during the construction phase of the proposed project can be mitigated with relative ease. The greatest factor to consider is the location of the construction camp out of potential views that may be experienced from scenic routes or tourist hotspots.

Operational Phase

Considering the extent of the proposed alignment, a great number of tourists will be affected during their visit. Although it is difficult to pinpoint particular locations in the study area that are of specific tourist value, since the entire study area bares value, the most obvious concentration of tourists can be expected in the eastern and central part of the study area. The presence of a transmission line in this undeveloped landscape will severely spoil the views that are currently experienced over the mountains.

It can be concluded that the proposed alignment will cause moderately-high visual intrusion for tourists travelling through the study area.

11.7.1.2.3 Visual Impact on Motorists

The major routes in the study area are the R511, R513, R514, R566, N4 and the old N4 connecting the towns, residential developments and informal settlements. The secondary and tertiary roads are a loose network of gravel roads linking smaller settlements and farms. These road networks in the study area carries a much lower volume of motorists. Their duration of views will be temporary and it is expected that the visual intrusion that they will experience will be low. For this report only motorists using the main routes will be considered as there are many countless smaller roads within the study area.

Construction Phase

The potential visual impact that may be experienced by motorists during the construction phase is considered to be minimal. Limited information is available and the number, location and size of the construction camps and lay-down yards are essential for accurately assessing the visual impact. It is anticipated that views of the construction camps and lay-down yards of the proposed alignment will be visible from the N4, R511, R513, R514, R566 and local roads.

The presence of the construction camp and lay-down yards may create unsightly views. Motorists' visual exposure to the impact will be brief and the severity of visual impact will be *low*. The significance of potential visual impact is expected to be *low.*

Operational Phase

On these roads, the N4 and R511 is the most prominent, carrying the highest volumes of traffic. The severity and significance of visual impact for the proposed alignments on motorists will be low for the Eastern Route and deviations and moderate for the rest. The speed at which motorists travel also has a moderating effect on the severity of the visual impact and further reduces visual exposure.

Mitigation measures are prescribed in the EMPr to ensure that the visual appearance of the construction site is not an eyesore the adjacent areas. Examples include the erection of a suitable fence and screen during construction and the reinstatement and rehabilitation of the development footprint.

11.7.2 Impact Assessment

Environmental Feature	**Visual Quality**
Relevant Alternatives & Activities	**All alternatives; access roads; construction camps**
Project life-cycle	**Construction phase**

Potential Impact	Proposed Management Objectives / Mitigation Measures
Reduction in visual quality due to construction activities.	• Suitable screening of works area. • Construction camps to be situated in areas with reduced impact to tourists. • On-going housekeeping to maintain a tidy construction area. • Proper reinstatement and rehabilitation of construction area.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	–-	local	medium-high	short-term	likely	2
After Mitigation	–-	local	medium	short-term	likely	1

The impacts assessment for the visual quality and associated attributes is supplemented by the following evaluation conducted as part of the Visual Impact Assessment (Axis Landscape Architecture, 2011).

SIGNIFICANCE OF LANDSCAPE IMPACTS

Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
Construction phase								
Eastern Route	Negative – Impacting on the visual quality of the landscape due to the presence of foreign elements and a loss of vegetation cover.	Local	Permanent if not mitigated	Low	Definite	Low	Low	High
Eastern Route Deviation				Low	Definite	Low	Low	High
Central Route				Moderate	Definite	Moderate	Low	High
Western Route				Low	Definite	Low	Low	High
Western Route Deviation 1 (Western Deviation)				Low	Definite	Low	Low	High
Western Route Deviation 2 (Eastern Deviation)				Low	Definite	Low	Low	High
Western Route Deviation 3 (Southern Deviation)				Low	Definite	Low	Low	High
Operational phase								
Eastern Route	Negative – Impacting on the visual quality of the landscape due the presence of a transmission line.	Local	Permanent	Low	Definite	Low	Low	High
Eastern Route Deviation				Low	Definite	Low	Low	High
Central Route				Low	Definite	Low	Low	High
Western Route				Moderate	Definite	Moderate	Low	High
Western Route Deviation 1 (Western Deviation)				Moderate	Definite	Moderate	Low	High
Western Route Deviation 2 (Eastern Deviation)				Low	Definite	Low	Low	High
Western Route Deviation 3 (Southern Deviation)				Low	Definite	Low	Low	High

VISUAL IMPACTS ON RESIDENTS

Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
Construction phase								
Eastern Route	Negative – Construction camp and lay-down yards may cause unsightly views.	Local	Temporary	Low	Probable	Low	Low	High
Eastern Route Deviation				Low	Definite	Low	Low	High
Central Route				Low	Definite	Low	Low	High
Western Route				Moderate	Definite	Moderate	Low	High
Western Route Deviation 1 (Western Deviation)				Moderate	Definite	Moderate	Low	High
Western Route Deviation 2 (Eastern Deviation)				Low	Definite	Low	Low	High
Western Route Deviation 3 (Southern Deviation)				Low	Definite	Low	Low	High
Operational phase								
Eastern Route	Negative – The presence of a transmission line intrudes on existing views and spoils the open views of the landscape.	Local	Permanent	Low	Definite	Low	Low	High
Eastern Route Deviation				Low	Definite	Low	Low	High
Central Route				Low	Definite	Low	Low	High
Western Route				Low	Definite	Low	Low	High
Western Route Deviation 1 (Western Deviation)				Low	Definite	Low	Low	High
Western Route Deviation 2 (Eastern Deviation)				Low	Definite	Low	Low	High
Western Route Deviation 3 (Southern Deviation)				Low	Definite	Low	Low	High

VISUAL IMPACTS ON TOURISTS

Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
Construction phase								
Eastern Route	Negative – Construction camp and lay-down yards may cause unsightly views.	Local	Temporary	Low	Probable	Low	Low	High
Eastern Route Deviation				Low	Definite	Low	Low	High
Central Route				Low	Definite	Low	Low	High
Western Route				Moderate	Definite	Moderate	Low	High
Western Route Deviation 1 (Western Deviation)				Moderate	Definite	Moderate	Low	High
Western Route Deviation 2 (Eastern Deviation)				Moderate	Definite	Moderate	Low	High
Western Route Deviation 3 (Southern Deviation)				Moderate	Definite	Moderate	Low	High
Operational phase								
Eastern Route	Negative – The presence of a transmission line intrudes on existing views and spoils the open views of the landscape.	Local	Permanent	Low	Definite	Low	Low	High
Eastern Route Deviation				Low	Definite	Low	Low	High
Central Route				Low	Definite	Low	Low	High
Western Route				Moderate	Definite	Moderate	Low	High
Western Route Deviation 1 (Western Deviation)				Moderate	Definite	Moderate	Low	High
Western Route Deviation 2 (Eastern Deviation)				Moderate	Definite	Moderate	Low	High
Western Route Deviation 3 (Southern Deviation)				Moderate	Definite	Moderate	Low	High

VISUAL IMPACTS ON MOTORISTS

Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
Construction phase								
Eastern Route	Negative – Construction camp and lay-down yards may cause unsightly views.	At a number of point locations	Intermittent	Low	Probable	Low	Low	High
Eastern Route Deviation				Low	Probable	Low	Low	High
Central Route				Moderate	Definite	Moderate	Low	High
Western Route				Moderate	Definite	Moderate	Low	High
Western Route Deviation 1 (Western Deviation)				Moderate	Definite	Moderate	Low	High
Western Route Deviation 2 (Eastern Deviation)				Moderate	Definite	Moderate	Low	High
Western Route Deviation 3 (Southern Deviation)				Moderate	Definite	Moderate	Low	High
Operational phase								
Eastern Route	Negative – The presence of a transmission line intrudes on existing views and spoils the open views of the landscape.	Local	Intermittent	Low	Definite	Low	Low	High
Eastern Route Deviation				Low	Definite	Low	Low	High
Central Route				Moderate	Definite	Moderate	Low	High
Western Route				Moderate	Definite	Moderate	Low	High
Western Route Deviation 1 (Western Deviation)				Moderate	Definite	Moderate	Low	High
Western Route Deviation 2 (Eastern Deviation)				Moderate	Definite	Moderate	Low	High
Western Route Deviation 3 (Southern Deviation)				Moderate	Probable	Moderate	Low	High

11.8 Agriculture

11.8.1 Impact Overview

The impacts of a transmission line of agricultural land use and activities depend on the transmission line design and the type of farming. Transmission lines can affect field operations, irrigation, aerial spraying, wind breaks, and future land development (land use restrictions). Tower placement in farm fields can:

- Create problems for turning field machinery and maintaining efficient fieldwork patterns;
- Create opportunities for weed encroachment;
- Compact soils;
- Result in safety hazards;
- Hinder or prevent aerial activities by planes or helicopters;
- Interfere with moving irrigation equipment; and
- Hinder future consolidation of farm fields or subdividing land for residential development.

It should be noted that the proposed transmission line will not result in the sterilisation of all the land within the servitude, and certain agricultural practices (e.g. some crop cultivation, grazing and the use of farm roads) are still possible.

The walk-down survey will aim to avoid (or minimise if avoidance is not possible) the placement of towers within cultivated land, depending of the possible distance that the line can be spanned in these areas.

The impacts associated with agriculture are managed through mitigation measures contained in the EMPr.

11.8.2 Impact Assessment

Environmental Feature	**Agriculture**
Relevant Alternatives & Activities	**All alternatives; access roads; construction camps**
Project life-cycle	**Construction & operation phase**

Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Disturbance to farming practices and livestock.	• Wherever possible, avoid placing transmission line structures in agricultural areas (e.g. span croplands). • Negotiate with landowner the timing of the construction activities and the exact locations of towers within agricultural land. • Suitable access arrangements to be made with landowners. • Safeguarding of livestock against construction activities (e.g. barricading excavations). • Proper reinstatement and rehabilitation of construction area.

+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**

Before Mitigation	–-	local	medium-high	short-term	likely	2
After Mitigation	–-	local	medium	short-term	likely	1

The impacts assessment for the Agricultural Potential and associated attributes is supplemented by the following evaluation conducted as part of the Agricultural Impact Assessment (Index, 2012).

Criteria	Potential Impact on Irrigated Crops	Potential Impact on Grazing
Nature	Existing crops will be destroyed during construction. Afterwards they can be replanted. The footprint of the pylon will permanently be sterilised. Routes A, B and C will be influenced, with B the most severely. D and E have little irrigated land.	Access to grazing will be impossible during construction. Only the footprint of the site will permanently be sterilised
Extent	The land in the servitude will be impacted on. Routes A, B and to a lesser degree C will be lose high potential land.	All routes will be impacted on to a small degree. Only the footprint will be sterilised.
Duration	Total withdrawal during construction. Permanent for the footprint of the pylon. The irrigation type may need to change.	Total withdrawal during the construction period. Permanent for the footprint of the pylon.
Intensity	Destructive during construction.	Benign after construction period.
Probability	Very likely to occur.	Very likely to occur.
Status	Negative.	Negative.
Significance	Moderate impact because a small portion of land is influenced. The loss on income cannot be calculated from the available data.	Low. The land us withdrawn for the construction period.

11.9 Social Environment

11.9.1 Impact Overview

Economic Impacts

There is likely to be a short term increase in economic activity as a result of the substation. The construction labour force will not only be earning an income in the area, but consumption will take place this increase the commercial activity and the flow of money in the area.

This may result in short term indirect economic gains, which will be in the form of purchasing construction material and transport.
Through the employment of local labour, skills and knowledge transfer is likely to take place which can increase the employability of these workers. Employment will also increase the income of households and capacity to be more productive.

The strength of the existing power lines will increase given the proposed power lines. Given that Pretoria is expecting to double its electricity demand in the next 20 – 30 years, the project is will secure stable supply of electricity to this region. The economic and social benefits is having a more secure electricity supply are clear and are felt in areas as diverse as education, health, public infrastructure such as street lighting, heating and cooling and uses in the productive economy.

Visual Tourism and Leisure Impacts

The tourism and leisure attractions in the Hartbeespoort area are well established. The mountains and dam provides opportunity for tourism. A large proportion of the study area is used for conservation, nature reserves, and accommodation and tourism facilities. Thus there is a visual appeal to the land which has been used to generate income.

The impact of having a transmission line in such an environment could result in loss of income. The visual appeal of the land will be negatively impacted by having a transmission line. Specifically, in the study area, the Silkaatsnek Nature Reserve, the Magaliesburg Natural Environment area and a portion of the Wonderboom Municipal Nature Reserve may be impacted.

Nature Reserves, when associated with tourism and leisure, derives their economic value from offering a glimpse of the natural wonders of the area, with a focus upon viewing game and the ecological habitat. This value proposition generally targets upper income earners, who place value on a rural sense of place and being in an environment that is as close to natural as possible. When this is not being offered, the value proposition decreases and the affected nature reserves would have to adjust its offering to the market to remain competitive.

Transmission lines impact upon the value proposition by bringing modern development to this natural environment, thereby reducing the rural and undeveloped sense of place.

The construction phase can impact negatively through loss of income or reputation as the natural environment is disturbed. Impacts associated with construction crew actions, resulting in the loss of stock or equipment should also be considered. Hence the final routing, construction and maintenance of the transmission lines should be carried out to have as little impact as possible on the tourism and leisure industries.

Land Value and Servitude

A servitude of fifty five meters or 27.5m on either side of the centre of the power line will need to be purchased. The purpose of the servitude is to ensure public safety, safe construction, maintenance and operation of the line.

Eskom will be entitled to unrestricted access. Negotiation with land owners on access control measures and security issues with regards to locking and unlocking of gates on private properties and damage to fences and gates will need to take place.

The land beneath the overhead lines and within the 55m wide servitude may continue to be used for some activities by the landowners, however, no crops or trees higher than 4m will be allowed along the route, and no structures may be developed underneath the line or within the servitude area.

The proposed power line can negatively impact the development and infrastructure plans for the area. Development within the 55m wide servitude will be restricted. Certain farming and current land use may need to be stopped completely or altered resulting in potential loss of income.

Provisions in South African law allow the establishment of a servitude for the use of the utility, whilst still preserving the ownership of the land with the landowner. The utility thus has rights over the land that exceeds those claimed by the landowner. This trade-off is generally negotiated between the utility and the landowner and involves the payment to the landowner of a sum of money in compensation for the land rights. In the event that agreement cannot be reached, the state does have the right to expropriate the land. This power exists to ensure that landowners who are in the path of proposed public utilities do not have the power to hold the project to unreasonable ransom and to ensure that the public good trumps individual rights.

Thus the emphasis should be on the value of compensation that is to be paid to the landowner for servitude rights. This value depends on the area of servitude, the land use of the servitude area, the impact on productivity and the alterations to land use that will be required.

Comparable sales are traditionally the method used for servitude valuations, where such values exist. This method will best take into account intangible factors such as the visual impacts of transmission lines.
Research suggests that where there are electricity transmission lines, the land value in close proximity to those transmission lines fall. In the study by Elliot and Wadley (2002) a list of various research papers were provided with the estimated value of the fall in property prices. It was found that the percentage decrease in property values ranges from 1 percent to 27 percent. The degree of depreciation depends upon the value, size and location of the property in question.

Larger properties were less affected than small properties, this applies particularly to farmland. It was also found that the higher the value of the land, the larger the impact on land value.

The literature also suggests that the impact on property prices diminishes over time. The impact of transmission lines on property values is initially high. Over time the visual impact decreases as trees and other developments surround the area. Thus the long term impact on property prices will likely be low.

The literature thus suggests that land values do decrease when servitudes are registered over them, and for this the landowner should be compensated. The legal and operational framework for compensation is well established and the channels for negotiation are open for landowners to follow. In this regard an excellent summary of the complexity of the compensation issue has been prepared by Rode and Associates C.C. in October 2007. The study is entitled "Gamma-Grassridge: Compensation Specialist Study" and was conducted for a proposed Eskom transmission line in the Eastern Cape Province.

It is suggested that the guidelines developed for the purposes of this study are used in the payment of compensation during the registering of servitudes over land affected by the routes.

With regards to land values and compensation for the use of a servitude, impacts and mitigation should take into account the following categories of concern:

- the visual impacts on lines;
- maintenance issues during operation;
- multiple lines on a single property;
- larger relative impacts on small properties than on large farms;
- the public relations aspects of Eskom's business; and
- loss of business caused by the servitude.

Loss of Production

The project area is generally rural in nature, with urban and commercial activity increasingly occurring. Land used for agriculture is the most common on the project study area with citrus and maize being farmed. Current farming practices may be disturbed due to the development of the transmission lines. This will be through loss of land available for produce as well as a capital cost on the value of the land. The will be an expected decline in output as agricultural activity in the servitude area will be limited. Thus there is likely to be a loss of potential and existing income.

The biggest lost of productive land is expected to occur during the construction phase of this development. There may an expected removal of all crops within the servitude land for construction and road purposes. Furthermore there is an impact on the way in which agriculture can take place. Transmission lines place a restriction on the types of agriculture that can occur on the land. Thus there is a loss of production capacity.

Agriculture accounts for 36 percent of employment in the area which means that land use has a significant economic impact on production and income generation. Thus the impact on the loss of agricultural land and limitation on agricultural activity is likely to be very significant.

The importance of agriculture for the communities cannot be overstated. In general, these communities are poor, located in geographic areas where the economic is not diversified away from agriculture and are generally able to offer only manual labour to the market. Thus these communities are economically vulnerable and disruption to agricultural production will have disproportionately large impacts on those affected.

Impacts on the Social Environment

The study area has a high population growth rate and is developing rapidly. With the proposed project which is likely to attract workers, this population growth rate may increase and cause further strain on development needs.

When workers come into an area, there is a need to supply municipal services to these workers. The municipality may or may not have the capacity to support a larger number of people. Thus causing strain on social services.

As is common with migrant workers in an area, there may be some social disruption. The relations between locals and new job seekers may not be smooth and lead to conflict in the community.

Workers entering the area will also be competing with locals for employment which may cause tension in the community. Locals and new job seekers will be competing for the same jobs. Thus it is important to deter job seekers and stress on local employment.

Relations between migrant workers and locals can potential cause health problems by rising HIV and AIDS or other sexually transmitted diseases. This is a typically the case when a large number of males enter into an area. Hostel like structures will need to be prevented and awareness campaigns should be conducted.
During construction, the safety and security of labourers around may be at risk when working with transmission lines. Thus effective mitigation measures will need to be in place to avoid loss of life or injury. There safety of farming livestock will also need to be ensured

Employment and Skills Transfer

There is likely to be a positive impact on employment especially during the construction phase. Construction of the power lines will require labour for building the power lines while the operation phase will require labour for maintenance.

Employment can become a sensitive issue, particularly the concern over local labour. There may conflict is migrant workers are given preference to employment opportunities. However the nature of transmission lines requires skilled labour.

Potential secondary employment impacts can result as small business employs more persons to sell goods to labourers.

The project has the potential to positively impact upon household incomes during the construction phase. In the study area, most people are low income earners thus employment of locals will create a positive impact on local communities who can derive some economic benefit from the project.

At least, the contractor should be barred from bringing unskilled labour in from areas outside the immediate area of construction. The contractor should also be encouraged to employ a proportion of their semi-skilled labour requirements from the ranks of the local communities. In addition, the contractor could be obliged to employ labourers on short term contracts of three months, similar to the government sanctioned Expanded Public Works Programme contracts. This would ensure that the project components create as many work opportunities in the affected areas as possible.

The project also has the potential to positively impact upon the skills levels in local communities during the construction phase. Only 19 percent of persons over the age of 20 matriculated. Thus the skill level of the community is not very high. Any local training and skills transfer that results from the project will create a positive impact.

Thus, the impact on skills acquisition would be largest if the transmission line followed the Main Route or Alternative Two, rather than Alternative Three. This conclusion is valid if the contractor implements skills-based training programmers at the site. Unskilled workers could be taught a skill and achieve a certificate to support the skill. This would provide a degree of assistance with the worker's future search for work and allow the project to leave a lasting legacy on the economic wellbeing of the affected community.

Thus if all other aspects are ambivalent about which routing to follow, the employment and skills transfer aspect would dictate which of the routes would most benefit the affected communities. This conclusion is modified by the proviso that the employment and skills impacts are relatively small and short-term in nature and that the populations of all routes would benefit from the employment and skills transfer potential offered by the proposed project.

Roads and Traffic

During the construction phase there may be traffic disruptions in the area. Heavy construction vehicles may cause damage to the roads. There may be temporary and permanent roads that will need to be built in

order to ensure proper maintenance of the power lines. Traffic will be temporary and mitigation can be done well in advance by awareness of the project.

11.9.2 Impact Assessment

The following impact assessment was extracted from the Socio – Economic Impact Assessment) (Nemai, 2011).

Economic Feature	General Economy
Relevant Alternatives & Activities	Eastern and Western Route
Project life-cycle	Pre- Construction and Construction phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Positive impact on the local economy.	• No mitigation required

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	+	Local	Low	Short	Almost Certain	3
After Mitigation	+	Local	Low	Short	Almost Certain	3

Economic Feature	General Economy
Relevant Alternatives & Activities	Eastern and Western Route
Project life-cycle	Operational Phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Positive impact of stable electricity supply	• No mitigation required

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	+	Local	Low	Long	Almost Certain	3
After Mitigation	+	Local	Low	Long	Almost Certain	3

Economic Feature	Visual , Tourism And Leisure Impacts
Relevant Alternatives & Activities	Eastern and Western Route
Project life-cycle	Pre- Construction and Construction phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Route selection that disrupts the visual appearance of tourism and leisure facilities can have a negative impact and result in loss of income. • Pylons placement that disrupts access to facilities.	• Route selection that avoids nature reserves is the most ideal outcome. Thus should Western Route South Alternative take place, it is advised that pylons be placed on the opposite end of the road to the Silkaatsnek Nature Reserve. • Where possible, routing should be selected to traverse low visual impact areas of any farm and areas that have low tourism values. This would mean that main roads such as the R511 are avoided. Care should be taken during route selection not to interrupt access and internal roads within tourism and leisure facilities; • The use of visually appealing pylons, or pylons that reduce the number of structures per kilometres should be used where appropriate.

• Disruption of tourism and leisure facilities due to construction activities which could later the nature of tourism activity. • Poor housekeeping by construction staff. • Stock losses due to poor construction housekeeping.	• Agreement should be reached with each landowner on the construction programme and impacts on the property during construction. Where necessary construction could be scheduled during low tourist season on affected farms. Agreements made prior to construction with respect to property access, the duration of construction and the impacts on the land should be adhered to by both the landowner and the utility. • All local mitigation measures agreed to for each operation should adhered to by Eskom site staff. • Eskom compensates affected landowners at a market-related rate for stock and equipment losses which are directly attributable to construction activities.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	Local	Medium	Medium	Likely	2
After Mitigation	-	Local	Low	Medium	Moderate	1

Economic Feature	**Visual , Tourism And Leisure Impacts**
Relevant Alternatives & Activities	**Eastern and Western Route**
Project life-cycle	**Operational Phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Disruption of tourism and leisure facilities due to operations and maintenance activities. • Poor housekeeping by operations and maintenance staff. • Stock losses due to poor operations and maintenance staff housekeeping.	• Operations and maintenance access should be arranged and discussed with the landowner prior to the operation being carried out. • All local mitigation measures agreed to for each operation should adhered to by Eskom site staff. • Eskom compensates affected landowners at a market-related rate for stock losses, directly attributable to operation and maintenance activities.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	Local	Low	Short	Moderate	2
After Mitigation	-	Local	Low	Short	Moderate	1

Economic Feature	**Impact on Land Values**
Relevant Alternatives & Activities	**Main Route; Alternative 2; Alternative 3; Alternative 4**
Project life-cycle	**Pre- Construction and Construction phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• The negative financial impact of having a servitude, or further servitude, registered over a property. • Access to the land may result in farmland and other property being vulnerable to theft and other security risks.	• Compensation should be paid by the utility for the right of use over the servitude. This value should be set via negotiation with affected landowners and take into account current norms and practice with regards compensation. The use of the power to expropriate land should not be excluded from consideration, given the wider public good that the transmission lines serve. • Mitigation could also take the form of off-sets resulting from the project. Examples include improving access to a series of properties to offset the economic impacts of the transmission line or through improving internal roads as part of access to the pylons. • Where there are existing power lines, the width of the servitude should be widened and the land should be used for the new transmission lines. This will minimise the negative impacts on the land and reduce the use of income generating land. • Land that has a lower economic value should be purchased for use of the power lines. This will minimise the impact on high value land and minimise the fall in property values.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance

Before Mitigation	-	Local	Medium	Medium	Likely	2
After Mitigation	-	Local	Low	Short	Moderate	1

Economic Feature	**Impact on Land Values**
Relevant Alternatives & Activities	**Main Route; Alternative 2; Alternative 3; Alternative 4**
Project life-cycle	**Operational Phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Access to the land may result in farmland and other property being vulnerable to theft and other security risks.	• Negotiation with farmers around access to land and safety is encouraged. Fencing of properties and the maintenance thereof should also be negotiated. Compensation for loss of stock where negligence on Eskom's behalf can be proved, should take place.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	Local	Medium	Long	Likely	2
After Mitigation	-	Local	Low	Long	Moderate	1

Economic Feature	**Loss of Production**
Relevant Alternatives & Activities	**Eastern Route and Western Route**
Project life-cycle	**Pre-Construction and Construction phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Route selection which disrupts agricultural production, impacts on irrigation is the most difficult to mitigate.	• Route selection that avoids irrigated agriculture • The use of high pylons to minimize disruption; • Care should be taken during route selection not to interrupt access and internal roads within agricultural production units; • The use of free-standing pylons where necessary to enable farming to proceed without encumbrance from guying. Due regard should be had when implementation • If more than one line crosses agricultural land, then route selection should, as far as possible, use the existing transmission line servitude in the crossing. Using a totally new routing should be avoided where possible this measure to the higher costs of the free-standing pylons. • Purchasing of produce should be negotiated with farmers. If farmer choose to harvest the land before construction that there will be no need for compensation. However, should the land remain un-harvested, there will be need to compensate farmers for produce that is left on the land.
• The cumulative impact of this project's lines adding to the existing lines on agricultural land will be higher as the number of lines increases.	• If more than one line crosses agricultural land, then route selection should as far as possible, use the existing transmission line servitude in the crossing. Using a totally new routing should be avoided where possible.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	Local	Medium	Medium	Likely	3
After Mitigation	-	Local	Low	Medium	Moderate	2

Economic Feature	**Loss of Production**
Relevant Alternatives & Activities	**Eastern Route and Western Route**
Project life-cycle	**Operational Phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**

• Route selection which disrupts agricultural production, impacts on irrigation is the most difficult to mitigate.	• Where possible, irrigation farming infrastructure should be avoided; • If it cannot be avoided, compensation to reinstate the infrastructure should be paid; • Where possible, the lines should be located so as to minimise the impact on production during the operation phase

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	Local	Medium	Long	Likely	2
After Mitigation	-	Local	Low	Long	Moderate	1

Economic Feature	**Impacts on the social environment**
Relevant Alternatives & Activities	**Eastern Route and Western Route**
Project life-cycle	**Pre-Construction and Construction phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Social conflict can be disrupted as a result of the potential job seekers entering the area. • The spread of disease due to hostel like living and relations between locals and job seekers take place. HIV/ AIDS and other STDs may spread as a result. • Safety and security of the workers and the community may be at risk during the construction phase	• Any mitigation to avoid new job seekers from entering the area should be avoided. These can be done through the encouragement of local labour and importing of only necessary skilled labour • Education campaigns on and awareness to on sexually transmitted diseases should take place to avoid health related issues. • Should there be significant imported labour, care should be taken to integrated workers into the local community to avoid any conflict and disturbance to the social structure of the surrounding communities. • In order to mitigate against theft on farmland during construction, there should be effective consultation and fencing where possible to ensure controlled access to farming land to prevent theft and opportunistic behaviour

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	Local	Medium	Medium	Likely	3
After Mitigation	-	Local	Low	Medium	Moderate	2

Economic Feature	**Impacts on the social environment**
Relevant Alternatives & Activities	**Eastern Route and Western Route**
Project life-cycle	**Operational Phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Social conflict can be disrupted as a result of the potential job seekers entering the area. • The spread of disease due to hostel like living and relations between locals and job seekers take place. HIV/ AIDS and other STDs may spread as a result.	• Any mitigation to avoid new job seekers from entering the area should be avoided. These can be done through the encouragement of local labour and importing of only necessary skilled labour • Education campaigns on and awareness to on sexually transmitted diseases should take place to avoid health related issues. • Should there be significant imported labour, care should be taken to integrated workers into the local community to avoid any conflict and disturbance to the social structure of the surrounding communities.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	Local	Medium	Long	Likely	2
After Mitigation	-	Local	Low	Long	Moderate	1

Economic Feature	Employment and Skills Transfer
Relevant Alternatives & Activities	Eastern Route and Western Route
Project life-cycle	Pre-Construction and Construction phase

Potential Impact	Proposed Management Objectives / Mitigation Measures
• Route selection that runs through or near areas of poverty will greatly enhance opportunities for the use of local labour during construction.	• Route selection to benefit more poverty affected areas, whilst taking into account the larger benefit of choosing the most cost efficient line will outweigh any local poverty alleviation benefits. • Compelling the contractor to use 100% local labour in the unskilled category of employment. • Compelling the contractor to use as much as possible local labour in the semi-skilled category of employment. • The use of three month long employment contracts to ensure that the maximum numbers of work opportunities are created in the area.
• Route selection that runs through or near areas of poverty will greatly enhance opportunities for a formal skills training programme to be implemented for the local labour force.	• Route selection to benefit areas with a higher education deficit, whilst taking into account the larger benefit of choosing the most cost efficient line will outweigh any skills training benefits. • Compelling the contractor to implement a skills training programme for the local labour force.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	+	Local	Low	Short	Unlikely	0
After Mitigation	+	Local	Low	Short	Likely	1

Economic Feature	Employment and Skills Transfer
Relevant Alternatives & Activities	Eastern Route and Western Route
Project life-cycle	Operational Phase

Potential Impact	Proposed Management Objectives / Mitigation Measures
Potential health issues related to the electric and magnetic field	Potential impacts are anticipated to be minimal based on previous studies however the site tower sites must be adequately fenced and danger and warning signs must be appropriately utilised.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	Local	Medium	Long	Likely	2
After Mitigation	-	Local	Low	Long	Moderate	1

Economic Feature	Roads and Traffic
Relevant Alternatives & Activities	Eastern Route and Western Route
Project life-cycle	Pre-Construction and Construction phase

Potential Impact	Proposed Management Objectives / Mitigation Measures

• Temporary disruptions to traffic during the construction phase may occur. • New road may be build – both temporary and long term which may impact land use and accessibility during the construction.	• In terms of using road, there should be no reliance on farmers and other landowners for usage of their roads. If there is a need for permanent roads, than land should be bought from the land owners and permanent roads should be built. This road can be built within the servitude. • Access to the roads should be limited to Eskom and farmer and other land owners. There will need to be negotiations with farm owners regarding access. This restriction on road usages is to ensure security for farmers. • Rehabilitation where temporary roads were constructed will need to be ensured

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	Local	Low	Short	Likely	2
After Mitigation	-	Local	Low	Short	Likely	1

Economic Feature	**Roads and Traffic**
Relevant Alternatives & Activities	**Eastern Route and Western Route**
Project life-cycle	**Operational Phase**

Potential Impact	Proposed Management Objectives / Mitigation Measures
• Safety and security as a result of access roads.	• Access to the roads should be limited to Eskom and farmer owners. There will need to be negotiations with farm owners regarding access. This restriction on road usages is to ensure security for farmers.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	Local	Low	Long Term	Likely	1
After Mitigation	-	Local	Low	Long Term	Likely	1

11.10 Cumulative Impacts

Box 4: What is a "Cumulative Impact"?

According to GN No. R. 385 (2006), ***"cumulative impact"***, in relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Cumulative impacts can be identified by combining the potential environmental implications of the project with the impacts of projects that have occurred in the past, are currently occurring, or are proposed in the future within the proposed corridor.

These are no known substantial linear projects that are planned within the corridor, which could exacerbate impacts associated with the construction phase of the project (e.g. erosion, vegetation clearing, disruption of farming / mining activities). Heavy vehicle construction traffic for the delivery of material and the

transportation of construction workers will lead to an increase in traffic on the regional transportation network. Due to the scale of the project, the size of the construction crews and the nature of material to be delivered, significant cumulative impacts are not anticipated.

Rehabilitation and eradication of alien and invasive vegetation along the corridor is regarded as a crucial management measure, as other smaller linear of localised projects could compound the proliferation of problematic floral species.

A common method for mitigating impacts related to new power lines is corridor sharing, and thereby increasing the footprints of existing linear developments (e.g. roads, power lines, railway lines). The Western Route and Eastern deviation is mostly situated along the main road and existing powerline.

Corridor sharing with existing facilities is usually encouraged because it minimises impacts by concentrating linear land uses and reducing the number of new corridors and by creating an incremental, rather than a new impact. The adoption of a development corridor aims to lessen the impacts to environmental features such as visual quality, flora, fauna, socio-economic aspects, heritage resources, especially when considered from a macro scale.

Corridor sharing can also have drawbacks. For example, where utility corridors run cross-country for long distances without crossing roadways, additional access roads could be required. If the corridor crosses environmentally sensitive areas, an expanded utility corridor would have additional impacts to the natural resources of the area. On smaller properties, the combined visual and economic impacts of an expanded corridor are also more severe. The corridor would also require a larger area to be cleared of vegetation. Landowners who already have a linear development on their property may feel unfairly burdened by the addition of another facility that further limits their rights and use of their property, or increases the impact of the existing facility (e.g. farms).

In general, the soils in the project areas are highly erodible due to the. Any previous disturbance (including grazing) will be aggravated by the construction activities if this impact is not properly managed.

The project was initiated due to increasing demands being placed on electricity supply. These demands will result in the respective Grid becoming increasingly unstable which, in turn is likely to have both a regional and macro-economic impact. It is intended for the Anderson-Dinaledi project to improve the reliability of supply of electricity in the Pretoria area. In turn, this will have a positive impact on the macro economy.

12 ANALYSIS OF ALTERNATIVES

Alternatives are the different ways in which the project can be executed to ultimately achieve its objectives. Examples could include carrying out a different type of action, choosing an alternative location or adopting a different technology or design for the project. This section explores the evolution in the identification and refinement of alternatives that occurred during the execution of the EIA process,

The section is concluded with the appraisal of all the environmental and technical considerations associated with the various alternatives through a comparative analysis to eventually distil the Best Practicable Environmental Option (BPEO). Münster (2005) defines the BPEO as the alternative that "*provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term*".

12.1 Overview of Alternatives

Of the various alternatives considered and discussed below, note that only the options pertaining to the alignments and tower structures were deemed feasible. In order to provide a point of reference for assessing the other alternatives, the "no go" option was also considered in the EIA.

12.1.1 Alignment Options

Through the EIA process, the following alignment alternatives were identified (refer to **Section 8.1**):

- **Western Alternative:** The Western Route Alternative is approximately 30km in length and runs between the proposed new Anderson Substation which is earmarked for development north of Pelindaba and the existing Dinaledi Substation which is located approximately 8km north east of Brits.
- **Western Alternative – Western Deviation:** This deviation originates on Portion 104 of the Farm Zilkaatsnek 439 JQ from where it links from the Western Route Alternative Deviation 3 (Southern Deviation). This deviation is approximately 8km's.
- **Western Alternative Eastern Deviation:** This deviation originates on Portion 14 of the Farm Zilkaatsnek 439 JQ where it links from the original Western Route Alternative. This deviation is approximately 6km's in length.
- **Western Deviation – Southern Deviation:** This deviation originates on Portion 70 of the Farm Rietfontein 485 JQ where it links from the original Western Route Alternative and is approximately 8km's in length.

- **Eastern Route Alternative:** The Eastern Route alternative is approximately 30km in length and runs between the existing Dinaledi Substation and the proposed new Anderson Substation.
- **Eastern Route Alternative Deviation:** The deviation to the eastern route originates on Portion 16 of the Farm Schietfontein 437 JQ where it turns from the original eastern route alternative in a north eastern direction, and then in a northern direction from where it traverses Portion 13 of the Farm Schietfontein 437 JQ. The route runs along the eastern boundary of Portion 13 for approximately 1.4km before it turns in a north western direction where it joins the original eastern route alternative on Portion 13. The deviation is approximately 4km's.
- **Central Route:** The Central Route Alternative originates on Portion 843 of the Farm Roodekopjes of Zwartkopjes 427 JQ where the Dinaledi Substation is located and is approximately 5km's.

Should authorisation for the final alignment be granted by DEA, and following the negotiations with landowners, the final positions of the towers and the centre line for the Anderson-Dinaledi 400kV Transmission line and coordinates of each bend in the line will be determined through a walk-down survey to be conducted by surveyors and the relevant environmental specialists.

12.1.2 Tower Structures

The various tower types for a 400kV transmission line are discussed in **Section 8.5**.

Should authorisation for the final alignment be granted by DEA, and following the negotiations with landowners, optimal tower sizes and positions will be identified and verified using a ground survey in terms of the EMPr requirements.

Due to the constant endeavour to enhance tower design to minimise adverse environmental impacts in a technical and economically viable manner, the tower types available at the actual time of construction may differ from those currently available.

12.1.3 Placing the Transmission Line Underground

There are currently no underground transmission lines of this capacity in South Africa and currently there are no plans to consider this option by Eskom Transmission.

It currently costs in the region of R1 million/km to construct an overhead 400kV transmission line, whilst placing the equivalent line underground costs approximately 10 times more (i.e. R10 million/km). It is thus not economically viable to place a transmission line of this voltage underground.

In addition to financial considerations, the environmental impact of placing such a line underground is high. This is mainly due to the large area needed for installation to ensure sufficient spacing of the conductors, as

they generate high heat and are not naturally cooled. Apart from certain grass types, no vegetation is allowed to grow on top of these underground lines. There are also severe restrictions in terms of land use, to allow for maintenance of the lines.

This option was not considered to be feasible and was disregarded following the Scoping phase.

12.1.4 "No Go" Option

As standard practice, the "no-go" option was included in the evaluation of the project alternatives.

The implications of the "no go" option are as follows:

- Inability to supply additional Transmission load;
- Poor Transmission reliability and Distribution quality of supply; and
- Possible shedding of Distribution load in the Tshwane area.

This alternative is not supported, as failure to provide the necessary electrical infrastructure could potentially hamper economic activity in this area.

In contrast, should the Anderson-Dinaledi 400kV project not go ahead, the negative impacts associated with the project highlighted in **Section 11** would be irrelevant and the environmental status quo would not be affected.

12.2 Specialist Studies

In the sub-sections to follow the findings of the various specialists in terms of their respective preferences to the alternative routes are provided.

12.2.1 Fauna and Flora Impact Assessment

According to the Fauna and Flora specialist, the Eastern route is regarded as the route alternative that would pose the greatest threat to the overall biodiversity of the area during construction of the proposed transmission line as it traverses through the sensitive areas such as MPNE, and the number of Orange Listed plant species recorded on this route were higher than the other route alternatives. **The preferred route in terms of flora and fauna sensitivity would be the Western Route-Western deviation**, as most parts of the route are along the main road and existing powerline and are considered less sensitive than the alternative routes in terms of biodiversity. The use of existing degraded habitat is preferable and habitat units known to be highly productive in supporting breeding, foraging and roosting sites, such as wetlands and ridges should be avoided.

12.2.2 Invertebrate Impact Assessment

According to the invertebrate specialist, **it is recommended that the transmission line follow the Western route.** The possible southern, eastern or western deviations do not need to be followed. The main reason for the recommendation is that there are existing powerlines along much of the western route. The establishment of a transmission line along a formerly undisturbed route will have greater impact on invertebrate diversity than its establishment along a route that already has been impacted by development. Additionally, the western route will traverse areas impacted considerably more by the development of roads and other anthropogenic activities than along the eastern route. From an environmental point of view, this route is considerably more degraded than the eastern route. The western route also traverses less natural Marikana Thornveld, the most threatened vegetation type transverse by the alternative routes.

12.2.3 Herpetological Study

During the preliminary herpetological habitat assessment or sensitivity scan the majority of habitats and vegetation along the proposed western alignment; except for the Magaliesburg Natural Protected Environment (MNE) and a few scattered granitic hills and outcrops; has been transformed through agriculture, formal settlements and other forms of infrastructure development, such as powerlines, roads (R511) and Telkom lines. The Eastern route is regarded as the route alternative that would pose the great threat to the overall biodiversity of the area during construction of the proposed transmission line as it traverses through the sensitive areas (rocky cliffs) of the Magaliesburg Natural Protected Environment, Wonderboom Municipal Nature reserve**. It is recommended that the transmission line follow the Western route. The southern, eastern or western deviations will not ameliorate any potential impacts on the herpetofuana.** The main reason for the recommendation of the western alignment is that there are existing powerlines along the majority of the proposed alignment and higher levels of anthropogenic disturbances along this route. The establishment of new transmission line servitudes along a formerly undisturbed area will have greater impact on herpetofauna diversity than if following adjacent to existing servitudes. From an ecological perspective the western route is considerably more degraded than the eastern route. The western route also traverses less natural Marikana Thornveld, the most threatened vegetation type transverse than the alternative alignments.

12.2.4 Heritage Impact Assessment

Based on the Heritage Impact Assessment, the specialist has stated that from a heritage perspective **the Eastern Route is the recommended** route adue to the increased number of heritage sites identified along the Western Rotue. The potential impacts will be of low significance if all recommended mitigation measures are adhered to.

12.2.5 Agricultural Potential Assessment

The agricultural specialist has **recommended that the Eastern route** be followed from an agricultural land use perspective.

12.2.6 Visual Impact Assessment

According to the Visual Impact Assessment, the **Eastern route is regarded as the most preferred alternative**. Its location and position in the landscape is considered to cause the least impact on the landscape character due to the reduced sensitivity of the landscape along the servitudes and the local roads.

The impact of the Eastern Route on visual receptors varies between residents, tourists and motorists. The Eastern Route's great advantage lies in the less significant landscape and visual impact on motorists and residents as compared to the other alternatives.

12.2.7 Socio-Economic Study

According to the socio-economic specialist, the preferred choice between the alternatives will be the alternative that has the lowest social and economic impacts.

The determination has been carried out with reference to the following impacts:

- Economic benefits of improved electricity supply at the lowest cost
- Visual, Tourism and Leisure Impacts
- Land Value and Servitude Impacts;
- Loss of Production;
- Impacts on the Social Environment;
- Employment and skills transfer during the construction phase; and
- Roads and Traffic Impacts.

These impacts were identified earlier in the study and do not include the positive impact of increased and more reliable electricity supply to the region. This impact is common, and equal, for all routes and can therefore be removed from consideration.

The economic requirement of lowest cost for the same quality of product is included in the evaluation criteria. The impact of damage to property has been excluded from the evaluation criteria owing to it being common to all routes. Although the costs to repair damage may be higher on higher value land, this is not certain, and may indeed be equal to the costs on lower value land.

The impacts of the cost of servitude acquisition, the potential disruption to economic and social activity along the Western Route are estimated to be higher than that posed by the Eastern Route. It is therefore concluded that **the preferred route is the Eastern route**.

12.2.8 Summary

For comparative purposes, the project areas was divided into a western, central and eastern routes, as shown in the figure below.

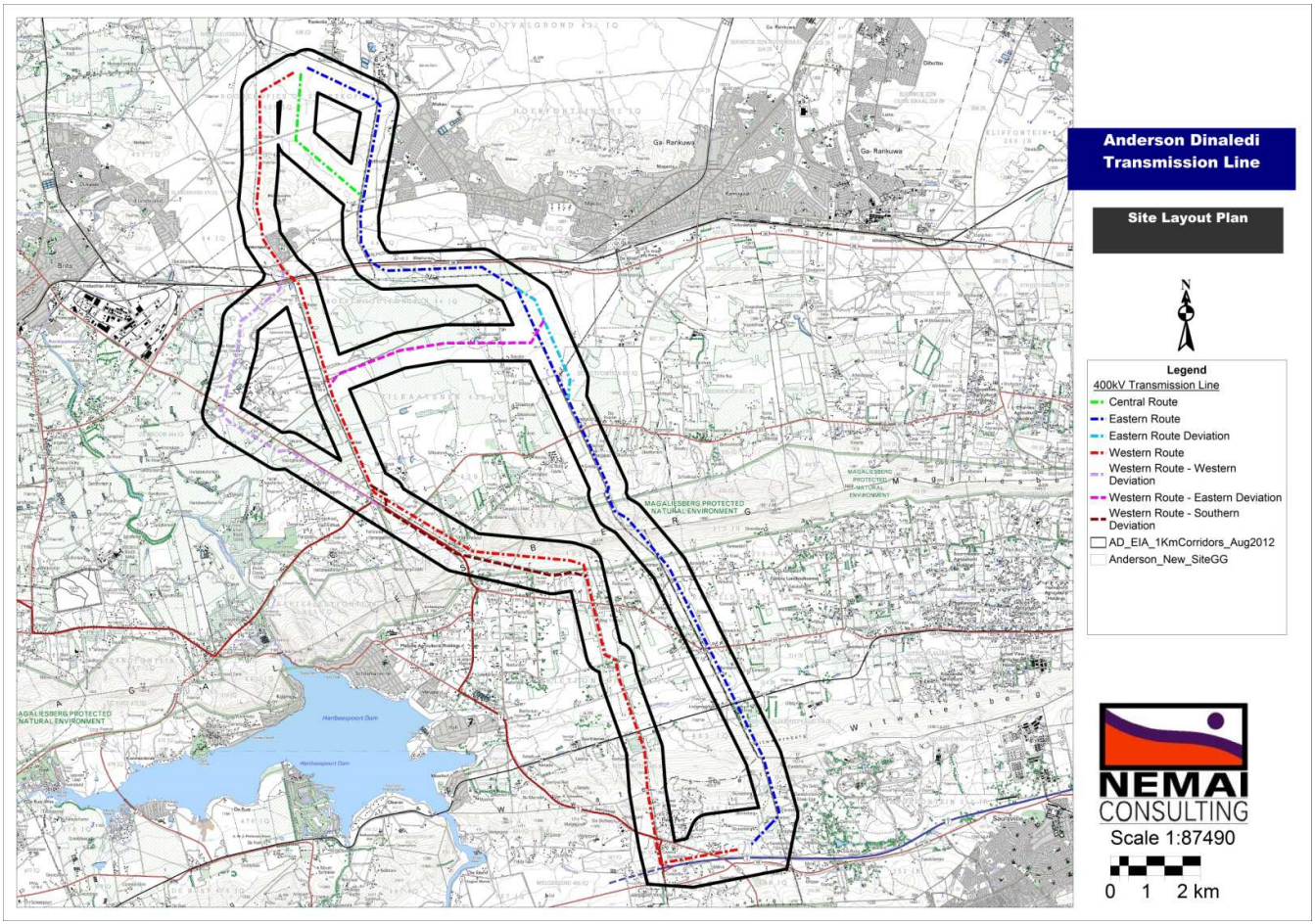

Figure 64: Layout of Anderson-Dinaledi 400kV alignment alternatives

A summary of the preferred alternatives, as recommended by the respective specialists, is tabulated below.

Table 38: Summary of Preferred Options recommended by Specialists

Specialist Study	Western Route	Western Route – Western Deviation	Western Route – Eastern Deviation	Western Route – Southern Deviation	Central Route	Eastern Route	Eastern Route – Eastern Deviation
Fauna and Flora Assessment		X					
Invertebrate Impact Assessment	X						
Herpetological Study	X						
Heritage Impact Assessment						X	
Socio-Economic Assessment						X	
Agricultural Potential Study						X	
Visual Impact Assessment						X	

12.3 Comparative Impacts of Alternative Routes

The table to follow compares the various route alternatives based on the receiving environment and the outcome of the impact assessment (**Section 11**).

Table 39: Comparative Impacts of Alternative Routes

(Note: Blocks highlighted in orange indicate the preferred option for each environmental feature; where no blocks are highlighted, no obvious preference exists)

Environmental Feature / Attribute	Western Route	Western Route – Eastern Deviation	Western Route – Western Deviation	Western Route Southern Deviation	Central Route	Eastern Route	Eastern Route – Eastern Deviation	No-Go Option
Topography	The transmission lines traverse mountainous and areas characterised by undulating plains. The potential impact on topography / landscape is considered to be greater for this alternative based on the specialist assessment.	The transmission lines traverse mountainous and areas characterised by undulating plains. The potential impact on topography / landscape is considered to be greater for this alternative based on the specialist assessment.	The transmission lines traverse mountainous and areas characterised by undulating plains. The potential impact on topography / landscape is considered to be greater for this alternative based on the specialist assessment.	The transmission lines traverse mountainous and areas characterised by undulating plains. The potential impact on topography / landscape is considered to be greater for this alternative based on the specialist assessment.	The transmission lines traverse mountainous and areas characterised by undulating plains. The potential impact on topography / landscape is considered to be greater for this alternative based on the specialist assessment.	The southern portion of the Eastern Route traverses the rugged landscape and the slopes of Magaliesberg and the Witwatersberg. The location and position of the landscape associated with this alternative is considered to cause the least impact on the landscape character due to the reduced sensitivity of the landscape along the servitudes and the local roads.	The southern portion of the Eastern Route traverses the rugged landscape and the slopes of Magaliesberg and the Witwatersberg. The location and position of the landscape associated with this alternative is considered to cause a lesser impact on the landscape character due to the reduced sensitivity of the landscape along the servitudes and the local roads.	No impact
Watercourses	Major river crossing includes Swartspruit,	Major river crossing includes Swartspruit,	Major river crossing includes Swartspruit,	Major river crossing includes	Major river crossing includes	Major river crossing includes	Major river crossing includes	No impact

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Environmental Feature / Attribute	Western Route	Western Route – Eastern Deviation	Western Route – Western Deviation	Western Route Southern Deviation	Central Route	Eastern Route	Eastern Route – Eastern Deviation	No-Go Option
	Crocodile and Moganwe Rivers. The Western route crosses more watercourses than the Eastern route. The potential impact is therefore anticipated to be greater on the Western route or any of the deviations in comparison to the Eastern route.	Crocodile and Moganwe Rivers. The Western route crosses more watercourses than the Eastern route. The potential impact is therefore anticipated to be greater on the Western route or any of the deviations in comparison to the Eastern route.	Crocodile and Moganwe Rivers. The Western route crosses more watercourses than the Eastern route. The potential impact is therefore anticipated to be greater on the Western route or any of the deviations in comparison to the Eastern route.	Swartspruit, Crocodile and Moganwe Rivers. The Western route crosses more watercourses than the Eastern route. The potential impact is therefore anticipated to be greater on the Western route or any of the deviations in comparison to the Eastern route.	Swartspruit, Crocodile and Moganwe Rivers. The Western route crosses more watercourses than the Eastern route. The potential impact is therefore anticipated to be greater on the Western route or any of the deviations in comparison to the Eastern route.	Swartspruit, Crocodile and Moganwe Rivers. The potential impact on the watercourses is anticipated to be less as the Western route crosses more watercourses than the Eastern route and there is exisintg infrastructure already in place to access the Eastern Route provided the Le-Mondt servitude is used.	Swartspruit, Crocodile and Moganwe Rivers. The potential impact on the watercourses is anticipated to be less as the Western route crosses more watercourses than the Eastern route and there is exisintg infrastructure already in place to access the Eastern Route provided the Le-Mondt servitude is used.	
Soil and agriculture	The central western portion of the study area, just north of the Magaliesberg consists of deep, reddish and vertic soils that is high potential if they can be irrigated. In terms of soil potential, this	The central western portion of the study area, just north of the Magaliesberg consists of deep, reddish and vertic soils that is high potential if they can be irrigated. In terms of soil potential, this alternative is	The central western portion of the study area, just north of the Magaliesberg consists of deep, reddish and vertic soils that is high potential if they can be irrigated. In terms of soil potential, this alternative is	The central western portion of the study area, just north of the Magaliesberg consists of deep, reddish and vertic soils that is high potential if they can be irrigated.	The central western portion of the study area, just north of the Magaliesberg consists of deep, reddish and vertic soils that is high potential	The land is either too shallow or rocky to cultivate and only suitable as grazing. The potential impact on the soil is anticipated to be the minimal	The land is either too shallow or rocky to cultivate and only suitable as grazing. The potential impact on soil is anticipated to be low due to the low	No impact

Environmental Feature / Attribute	Western Route	Western Route – Eastern Deviation	Western Route – Western Deviation	Western Route Southern Deviation	Central Route	Eastern Route	Eastern Route – Eastern Deviation	No-Go Option
	alternative is anticipated to have a greater impact than all other alternatives due to the high irrigation potential. It is important to note that the potential impact on irrigated land can be significantly, by locating the towers out of those areas.	anticipated to have a greater impact due to the high irrigation potential.	anticipated to have a greater impact due to the high irrigation potential.		if they can be irrigated.	with the route alternative.	irrigation potential.	
Flora	The vegetation on this route is highly disturbed due to previous construction of the transmission lines and is dominated by weeds and alien invasive species such as *Melia azedarach, Opuntia ficus-indica, Campuloclinium macrocephalum,* and *Solanum mauritianum.* The sensitive areas that the proposed route will traverse are the Magaliesberg Natural Area, MPNE, and Magaliesberg & Witwatersberg IBA.	The vegetation on this route is highly disturbed due to previous construction of the transmission lines and is dominated by weeds and alien invasive species such as *Melia azedarach, Opuntia ficus-indica, Campuloclinium macrocephalum,* and *Solanum mauritianum.* The sensitive areas that the proposed route will traverse are the Magaliesberg Natural Area, MPNE, and Magaliesberg & Witwatersberg IBA.	The vegetation on this route is highly disturbed due to previous construction of the transmission lines and is dominated by weeds and alien invasive species such as *Melia azedarach, Opuntia ficus-indica, Campuloclinium macrocephalum,* and *Solanum mauritianum.* The sensitive areas that the proposed route will traverse are the Magaliesberg Natural Area, MPNE, and Magaliesberg & Witwatersberg IBA.	The vegetation on this route is highly disturbed due to previous construction of the transmission lines and is dominated by weeds and alien invasive species such as *Melia azedarach, Opuntia ficus-indica, Campuloclinium macrocephalum,* and *Solanum mauritianum.* The sensitive areas that the proposed route will traverse are the Magaliesberg	The koppie/ridge, through which the proposed transmission will traverse, provides a suitable habitats for Red Data listed species.	These route alternatives will traverse through sensitive areas such as the MPNE, Wonderboom Municipal Nature Reserve, and Magaliesberg & Witwatersberg IBA and the number of orange listed species is greater along this route in comparison to other alternative routes. The	These route alternatives will traverse through sensitive areas such as the MPNE, Wonderboom Municipal Nature Reserve, and Magaliesberg & Witwatersberg IBA.	No impact

Environmental Feature / Attribute	Western Route	Western Route – Eastern Deviation	Western Route – Western Deviation	Western Route Southern Deviation	Central Route	Eastern Route	Eastern Route – Eastern Deviation	No-Go Option
	The western route alternative incorporates the existing powerlines, mostly along the R511 to Brits and passes through the Xstrata Eland Platinum Mine	The western route alternative incorporates the existing powerlines, mostly along the R511 to Brits and passes through the Xstrata Eland Platinum Mine	The western route alternative incorporates the existing powerlines, mostly along the R511 to Brits and passes through the Xstrata Eland Platinum Mine. This alternative poses the least significant impact in comparison to all other alternative routes as most parts of the route are along the main road and existing powerline.	Natural Area, MPNE, and Magaliesberg & Witwatersberg IBA. The western route alternative incorporates the existing powerlines, mostly along the R511 to Brits and passes through the Xstrata Eland Platinum Mine		potential impact to overall biodiversity is the greatest with this route.		
Fauna – Avifauna and Mammals	Mammal species diversity was low across the alternative sites. No sensitive or endangered mammals were visually recorded during the site visits.	Mammal species diversity was low across the alternative sites. No sensitive or endangered mammals were visually recorded during the site visits. .	Mammal species diversity was low across the alternative sites. No sensitive or endangered mammals were visually recorded during the site visits. The potential impact to fauna as a result of the proposed powerline is anticipated to be the least significant in comparison to the other alternatives due to	Mammal species diversity was low across the alternative sites. No sensitive or endangered mammals were visually recorded during the site visits.	Mammal species diversity was low across the alternative sites. No sensitive or endangered mammals were visually recorded during the site visits.	Mammal species diversity was low across the alternative sites. No sensitive or endangered mammals were visually recorded during the site visits. This alternative is anticipated to pose the	Mammal species diversity was low across the alternative sites. No sensitive or endangered mammals were visually recorded during the site visits.	No impact

Environmental Feature / Attribute	Western Route	Western Route – Eastern Deviation	Western Route – Western Deviation	Western Route Southern Deviation	Central Route	Eastern Route	Eastern Route – Eastern Deviation	No-Go Option
			existing disturbances			greatest risk to fauna as the areas along the route is not highly disturbed.		
Fauna – Invertebrates and Herpetofauna	It is anticipated that the potential impacts to invertebrates and herpetofauna that may occur as a result of the proposed powerline will be the least significant for this alternative route as there are existing powerlines along the majority of the proposed alignment and higher levels of anthropogenic disturbances along this route. No major breeding habitats of Giant Bullfrogs were observed along the proposed Anderson-Dinaledi 400kV Transmission Line alternatives, however there are records of the giant bullfrog around the	No major breeding habitats of Giant Bullfrogs were observed along the proposed Anderson-Dinaledi 400kV Transmission Line alternatives, however there are records of the giant bullfrog around the Magaliesburg-Brits area. Southern African Pythons have been recorded from the Magaliesburg Protected Natural Environment (MPNE).	No major breeding habitats of Giant Bullfrogs were observed along the proposed Anderson-Dinaledi 400kV Transmission Line alternatives, however there are records of the giant bullfrog around the Magaliesburg-Brits area. Southern African Pythons have been recorded from the Magaliesburg Protected Natural Environment (MPNE).	No major breeding habitats of Giant Bullfrogs were observed along the proposed Anderson-Dinaledi 400kV Transmission Line alternatives, however there are records of the giant bullfrog around the Magaliesburg-Brits area. Southern African Pythons have been recorded from the Magaliesburg Protected Natural Environment (MPNE).	No major breeding habitats of Giant Bullfrogs were observed along the proposed Anderson-Dinaledi 400kV Transmission Line alternatives, however there are records of the giant bullfrog around the Magaliesburg-Brits area. Southern African Pythons have been recorded from the Magaliesburg Protected Natural Environment	Most of the eastern route is undisturbed and as such the proposed powerline is anticipated to have the greatest impact along this route in comparison to the other alternative routes. No major breeding habitats of Giant Bullfrogs were observed along the proposed Anderson-Dinaledi 400kV Transmission Line alternatives, however there are records of the giant bullfrog around the	No major breeding habitats of Giant Bullfrogs were observed along the proposed Anderson-Dinaledi 400kV Transmission Line alternatives, however there are records of the giant bullfrog around the Magaliesburg-Brits area. Southern African Pythons have been recorded from the Magaliesburg Protected Natural Environment (MPNE).	There will be no impact on the fauna in these areas. No major breeding habitats of Giant Bullfrogs were observed along the proposed Anderson-Dinaledi 400kV Transmission Line alternatives, however there are records of the giant bullfrog around the Magaliesburg-Brits area. Southern African Pythons have been recorded from

Environmental Feature / Attribute	Western Route	Western Route – Eastern Deviation	Western Route – Western Deviation	Western Route Southern Deviation	Central Route	Eastern Route	Eastern Route – Eastern Deviation	No-Go Option
	Magaliesburg-Brits area. Southern African Pythons have been recorded from the Magaliesburg Protected Natural Environment (MPNE).				(MPNE).	Magaliesburg-Brits area. Southern African Pythons have been recorded from the Magaliesburg Protected Natural Environment (MPNE).		the Magaliesburg Protected Natural Environment (MPNE).
Heritage resources	A greater number of heritage sites were identified along the western route and the potential impacts are therefore considered to be of greater significance.	A greater number of heritage sites were identified along the western route and the potential impacts are therefore considered to be of greater significance.	A greater number of heritage sites were identified along the western route and the potential impacts are therefore considered to be of greater significance.	A greater number of heritage sites were identified along the western route and the potential impacts are therefore considered to be of greater significance.	No heritage resources were identified along the corridor route.	Fewer heritage sites were identified along the Eastern route and this route is therefore preferred in terms of heritage signifance.	Fewer heritage sites were identified along this route in comparison to the Western route.	No impact
Social - Economic aspects	The impacts of the cost of servitude acquisition, the potential disruption to economic and social activity along the Western Route are estimated to be higher than that posed by the Eastern Route.	The impacts of the cost of servitude acquisition, the potential disruption to economic and social activity along the Western Route are estimated to be higher than that posed by the Eastern Route.	The impacts of the cost of servitude acquisition, the potential disruption to economic and social activity along the Western Route are estimated to be higher than that posed by the Eastern Route.	The impacts of the cost of servitude acquisition, the potential disruption to economic and social activity along the Western Route are estimated to be higher than	The impacts of the cost of servitude acquisition, the potential disruption to economic and social activity along the Western Route are estimated to	The impacts of the cost of servitude acquisition, the potential disruption to economic and social activity along the Western Route are estimated to be higher	The impacts of the cost of servitude acquisition, the potential disruption to economic and social activity along the Western Route are estimated to be higher	Future development may be compromised if electricity Grid is not strengthened.

Environmental Feature / Attribute	Western Route	Western Route – Eastern Deviation	Western Route – Western Deviation	Western Route Southern Deviation	Central Route	Eastern Route	Eastern Route – Eastern Deviation	No-Go Option
				that posed by the Eastern Route.	be higher than that posed by the Eastern Route.	than that posed by the Eastern Route.	than that posed by the Eastern Route.	
Transportation - Roads	The proposed powerline is anticipated to cross the following major routes N4, R566, R513, R511, R514 and the R104. Access roads may be required across streams and watercourses.	The proposed powerline is anticipated to cross the following major routes N4, R566, R513, R511, R514 and the R104. Access roads may be required across streams and watercourses.	The proposed powerline is anticipated to cross the following major routes N4, R566, R513, R511, R514 and the R104. Access roads may be required across streams and watercourses.	The proposed powerline is anticipated to cross the following major routes N4, R566, R513, R511, R514 and the R104. Access roads may be required across streams and watercourses.	The proposed powerline is anticipated to cross the following major routes N4, R566, R513, R511, R514 and the R104. Access roads may be required across streams and watercourses.	The proposed powerline is anticipated to cross the following major routes N4, R566, R513, R511 and the R514. Access roads may be required across streams and watercourses.	The proposed powerline is anticipated to cross the following major routes N4, R566, R513, R511 and the R514. Access roads may be required across streams and watercourses.	No impact
Visual quality	This route is anticipated to have a lesser impact that the eastern alternatives due to the location and position of the powerlines and towers; however it is important to note that the landscape and visual impacts occurring during the construction phase can be mitigated relatively effectively.	This route is the least preferred in terms of the visual impacts that may result due to the location and position of the powerlines and towers; however it is important to note that the landscape and visual impacts occurring during the construction phase can be mitigated relatively effectively.	This route is anticipated to have a lesser impact that the eastern alternatives due to the location and position of the powerlines and towers; however it is important to note that the landscape and visual impacts occurring during the construction phase can be mitigated relatively effectively.	This route is anticipated to have a lesser impact that the eastern alternatives due to the location and position of the powerlines and towers; however it is important to note that the landscape and visual impacts occurring during the construction phase can be	This route is anticipated to have a lesser impact that the eastern alternatives due to the location and position of the powerlines and towers; however it is important to note that the landscape and visual impacts occurring	The Eastern Route is regarded as the most preferred alternative. Its location and position in the landscape is considered to cause the least impact on the landscape character due to the reduced sensitivity of the landscape	The Eastern Route – Eastern Deviation is regarded as the second preferred alternative. Its location and position in the landscape is considered to cause the least impact on the landscape character due to the reduced	No impact

Environmental Feature / Attribute	Western Route	Western Route – Eastern Deviation	Western Route – Western Deviation	Western Route Southern Deviation	Central Route	Eastern Route	Eastern Route – Eastern Deviation	No-Go Option
				mitigated relatively effectively.	during the construction phase can be mitigated relatively effectively.	along the servitudes and the local roads.	sensitivity of the landscape along the servitudes and the local roads.	

12.4 BPEO Selection

Based on the recommendations of the specialists and the comparison of the impacts associated with the various alignments, the following options are considered to be the preferred alternatives:

Western Route: The invertebrate and herpetological specialist recommends that the western route be recommended as the preferred route, the southern, eastern and western deviations will not ameliorate any potential impact.

Western Route – Western Deviation: The flora and fauna specialist recommends that this route be recommended in terms of flora and fauna sensitivity as most parts of the route are along the main road and existing powerline and are considered less sensitive than the alternative routes in terms of biodiversity.

Eastern Route: This route option is recommended by the Heritage, Visual, Agricultural and Socio-Economic specialists.

Based on the recommendations by the specialists and the impact assessment, **the Best Practicable Environmental Option (BPEO) is the Eastern Route**. There are a number of reasons for this recommendation highlighted in the text below:

- According to the the flora and fauna study, the Eastern route is regarded as the route alternative that would pose the greatest threat to the overall biodiversity of the area **during construction of the proposed transmission line** as it traverses through the sensitive areas such as MPNE, and the number of Orange Listed plant species recorded on this route were higher than the other route alternatives. However it must be noted that the line and the pylons can be relocated within the corridor to avoid these listed species and where these species cannot be avoided then the relevant permit must be obtained. It is therefore in the opinion of the EAP that the potential impact on the Eastern route can be mitigated against in terms of flora and fauna.
- In terms of the invertebrate and herpetological assessments, there were no species of conservation identified along any of the routes and as such the potential impact on the Eastern route can be mitigated against.
- Both the Eastern and Western routes cross the MPNE and as such irrespective of the route chosen, the powerline will cross the MPNE, However the existing Le-Mondt line which follows part of the Eastern route has a servitude of 22m that is already disturbed and will be decommissioned in early 2014 and it is therefore anticipated that if the powerline follows the Eastern Route, the potential impacts can be mitigated against as the existing Le-Mondt 22m servitude can be used for a portion of the Eastern route. Where there is already existing disturbance from the exisintg infrastructure.

- As with the Western route, there are also existing powerlines that span most of the length of both routes and therefore irrespective of which route is chosen, the new Anderson-Dinaledi line will be located along exisintg powerline.
- Should the western route be used, the potential impacts from a Heritage, Socio-Economic, Visual and Agricultural perspective will be of higher / of greater significance than the Eastern route. The potential impacts as a result of the Eastern route are anticipated to be much less significant than the Western route.
- In addition to this, the Hartbeespoort Environment Heritage Association (HEHA) stated in the comments submitted on the 09/11/2012, that the Western route is more sensitive in terms of avifauna, reptiles and amphibians and heritage and as such the western route should not be the preferable route for the Anderson-Dinaledi Transmission line. It is therefore in the opinion of the EAP that the Eastern route therefore be used as the preferred route.

It is imprtoant at this point to note that according to NEMA (1998) the environment is defined as the natural environment and the physical chemical, aesthetic and cultural properties of it that influence human health and well-being. **It is therefore recommended that the Eastern route be chosen as the preferred route as it is considered to be the BPEO.**

12.5 Route Refinement

Within the 1km corridor and through the spanning of the line the following sensitive features and areas need to be avoided as far as possible:

- Human settlements;
- Any conservation or protected areas;
- Active clay soil, marshy or flooding areas;
- Aerodrome statutory safety zones;
- Sugar cane fields, plantations;
- Irrigated land, windmills, boreholes;
- Open cast mining;
- Rugged terrain, extensive rock outcrops;
- Potential unstable side-slope terrain;
- Eroded and unstable areas;
- Railway lines/major roads angle of crossing (60º to 90º) because of interference to telecommunication system; and
- Railway lines telecommunication safety zone (when running parallel to them).

Taking into consideration the above-mentioned features as well as the environmental context of the project area, potentially significant environmental issues and suggestions made by the I&APs and EIA team, the

route of the BPEO can be refined. The majority of the route refinement will take place during the walk-down survey, as well as through the negotiation process for the servitude registration.

13 PUBLIC PARTICIPATION – EIA PHASE

The purpose of public participation includes:

- Providing I&APs with an opportunity to obtain information about the project;
- Allowing I&APs to present their views, issues and concerns with regard to the project;
- Granting I&APs an opportunity to recommend measures to avoid or reduce adverse impacts and enhance positive impacts associated with the project; and
- Enabling Eskom and the project team to incorporate the needs, concerns and recommendations of I&APs into the project.

Box 3:	**What is an "I&AP"?**
According to Government Notice GN No. R. 385 (2006), "*Interested and Affected Party*" (I&AP) means an party contemplated in section 24(4)(d) of the NEMA, and which in terms of that section includes – (a) any person, group of persons or organisation interested in or affected by an activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity.	

The public participation process that was followed for Anderson-Dinaledi Project is governed by NEMA and GN No. R. 385. The Plan of Study for the EIA stipulates the activities to be undertaken as part of the public participation for the Anderson-Dinaeldi Project, in accordance with regulatory requirements, which forms the basis of the discussions to follow. Note that the public participation conducted for the Scoping phase will not receive attention in this section as it was comprehensively discussed in the Scoping Report. Emphases will thus primarily be placed on the EIA public participation process.

Figure 65 outlines the key milestones in the public participation process undertaken for the Scoping and EIA phases for the proposed Anderson-Dinaledi 400kV transmission line.

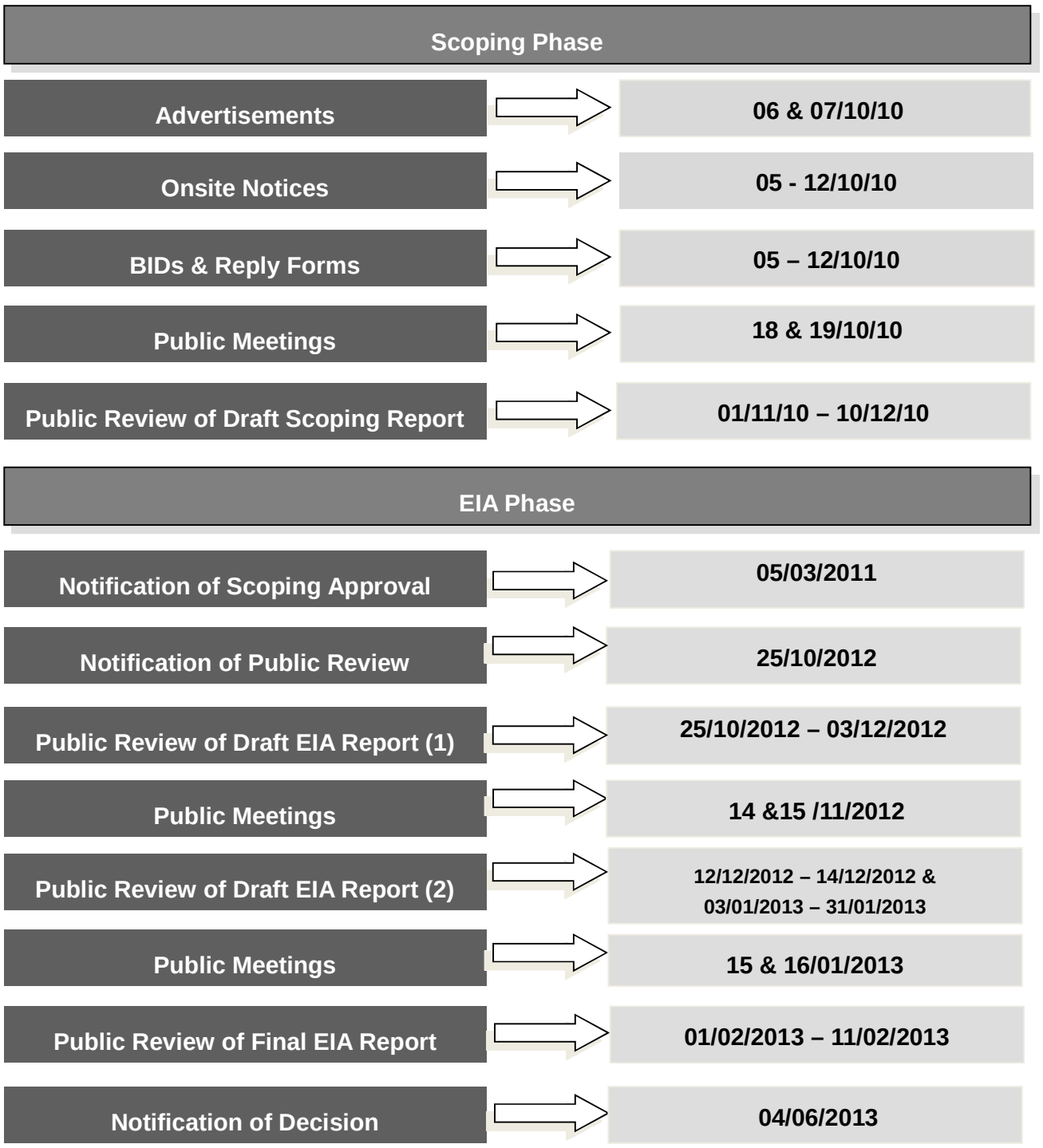

Figure 65: Public Participation Process for Anderson-Dinaledi 400 kV transmission line

13.1 Maintenance of the I&AP Database

The database of I&APs, which contains particulars of *inter alia* authorities, stakeholders, landowners and members of the general public, was maintained during the EIA phase.

Directly affected landowners along the route were identified *inter alia* by using the information provided by Eskom for their existing servitude. The remainder of the details for directly affected landowners along all alternative routes were identified through a deed search on affected properties within the 1 km corridor (i.e. 500 m on either side of the servitude centre line), and through discussions held with the Agricultural Sector, Municipal Planning departments, Department of Land Affairs: Deeds Registration and known landowners.

13.2 Notification – Approval of Scoping Report

Advertisements were placed in the following newspapers as notification that the Scoping Report had been approved by DEA (refer to copies of the newspaper advertisements contained in ***Appendix I***):

- The Star: 06/10/2010
- The Beeld: 07/10/2010; and
- The Kormoront: 07/10/2010.

In addition, all I&APs on the database were notified of the approval of the Scoping Report and commencement of the EIA phase via fax, email or registered mail.

13.3 Comments and Response Report

The correspondence received from I&APs during the EIA phase is included in ***Appendix H.*** This Report also attempts to addresses the comments through input from the project team. Note that all comments received following the public review of the Draft EIA Report will be included in the final EIA Comments and Response Report.

13.4 Review of Draft EIA Report

13.4.1 Notification

I&APs will be notified as follows of the opportunity to review the Draft EIA Report:

- A notification letter of the Draft EIA Reports were forwarded to I & APs; and
- Newspaper advertisements were placed as notification on 25 and 26 October 2012 and on 10 and 13 December 2012 in the following newspapers:
    - The Star;

- The Beeld; and
- The Kormoront.

13.4.2 Lodging and Distribution of Draft EIA Report

The Draft EIA Report (version 1) was placed at the locations provided in the table below to allow the I&APs to review the document. A fourty-day review period (from 25th October 2012 until 03rd December 2012) was granted.

Table 36: Locations for review of Draft EIA Report

Location	Address	Tel. No.
Hoërskool Brits	1 Johan Street Brits	Adolf Gouws 012 252 3228
Laerskool Broederstroom	Plot 33, Primula Street, Flora Park	087 940 9167
Madibeng Community Library	51 Van Velden Street, Brits Office Hours: Mon-Fri: 09:00-17:00 Saturdays: 09:00-12:00	012 318 9318
Schoemansville Library	Marais Street, Schoemansville	012 253 1177

The Draft EIA Report (version 2) was placed at the locations provided in the table below to allow the I&APs to review the document. A thirty-day review period (from 12-14 December 2012 and 03-31 January 2013) will be granted.

Table 37: Locations for review of Draft EIA Report

Location	Address	Tel. No.
Madibeng Community Library	51 Van Velden Street, Brits Office Hours: Mon-Fri: 09:00-17:00 Saturdays: 09:00-12:00	012 318 9318
Schoemansville Library	Marais Street, Schoemansville	012 253 1177

Copies of the Draft EIA Report will be provided to the following Authorities for review:

- Department of Environmental Affairs (DEA);
- Gauteng Department of Agriculture and Rural Development (GDARD);
- North West Department of Agriculture, Conservation and Environment;
- Madibeng Local Municipality;
- City of Tshwane Metropolitan Municipality;
- South African National Roads Agency (SANRAL);
- North West Province Roads Department;

- North West Department of Housing;
- Department of Mineral Resources (DMR);
- Department of Water Affairs (DWA);
- National Department of Agriculture (NDA);
- Provincial Heritage Resources Authority, Gauteng; and
- South African Heritage Resources Authority.

The Draft EIA Report was also placed on the Eskom website (www.eskom.co.za/eia) for all I&Aps to review.

13.4.3 Public Meetings

Public meetings were held on the 14 and 15 November 2012 to present the Anderson substation Draft EIA Report (version 1). Public meetings will also be held in January to review the Draft EIA Report (version 2).

Table 38: Details of public meetings held to present the Draft EIA Report (version 2)

15 January 2013	**Venue:**	Motozi Lodge, R104 Hartbeespoort
	Time:	17:30-19:30
16 January 2013	**Venue:**	Dassie Paleis, Spoorweg St, Brits
	Time:	17:30-19:30

I&APs will be notified via email, fax or post regarding the details of the meetings. The advertisements discussed in **Section 13.4.1** will also contain the particulars of the abovementioned public meetings.

The aims of the public meetings include the following:

- To present the project details (i.e. alternative routes considered);
- To present the findings of the specialist studies;
- To address key issues raised during the EIA Process;
- To elaborate on the potential environmental impacts (qualitative and quantitative), and the proposed mitigation of these impacts;
- To present the findings of the comparative analysis of the alternatives;
- To explain the EIA process; and
- To allow for queries and concerns to be raised, and for the project team to respond.

13.5 Review of Final EIA Report

The Final EIA Report will be lodged in the public domain for a two week period to grant I&APs and opportunity to review the document. Copies of the document will be lodged at the same places listed in **Table 37** and it will be placed on the Eskom website (*www.eskom.co.za/eia*). All attendees of the public meetings will be notified of the review process.

13.6 Notification of DEA Decision

All I&APs will be notified via email, fax or post within 10 days after having received written notice from DEA on the final decision for the Anderson-Dinaledi EIA Report. Advertisements will also be placed in local and regional newspapers regarding the Department's decision. These notifications will include the appeal procedure to the decision and key reasons for the decision. A copy of the decision would be provided to I&APs on request.

13.7 Landowner Notification

In terms of regulation 16(1) of GN No. R. 385 of 21 April 2006, landowner consent is required if the applicant (i.e. ESKOM) is not the owner of the land on which the proposed activity is to be undertaken. According to regulation 16(3), this stipulation does not apply to a linear activity provided the applicant "has given notice of the proposed activity to the owners of the land on which the activity is to be undertaken as soon as the proposed route or route alternatives have been identified". The last mentioned provision was attended to during public participation. Landowner consent will thus not be sought for the linear components of the Anderson-Dinaledi Project.

14 EIA CONCLUSIONS AND RECOMMENDATIONS

14.1 Sensitive Environmental Features

Should authorisation for the final alignment be granted by DEA, and following the negotiations with landowners, the final position of the towers and the centre line for the Anderson-Dinaledi 400 kV transmission line and coordinates of each bend in the line will be determined by the surveyors, line design engineers and environmental specialists.

Within the context of the project area, cognisance must be taken of the following sensitive environmental features, attributes and aspects, for which mitigation measures are included in the EIA Report and draft EMPr:

- Erosion control measures are deemed to be crucial especially once the surface soil, vegetation and plant cover has been compromised.
- The encroachment of the construction activities (transmission line, access roads and construction camp) into the regulated areas of watercourses (i.e. 1:100 year floodline or delineated riparian / wetland habitats, whichever is greatest) could adversely affect resource quality by altering flow, reducing water quality, altering habitat and impacting on aquatic biota. These impacts could be exacerbated during the rainy season, if suitable mitigation measures are not in place. Accepting that the objectives and measures included in the draft EMPr pertaining to reinstatement and rehabilitation of the watercourses are adopted and implemented and that the regulated areas of watercourses will be avoided, the potential impacts should be temporary and restricted to the construction phase. Specific management requirements and measures are listed in the EMPr to address the construction-related impacts to the resource quality of the affected watercourses.
- Although much of the project area is utilised for farming and mining and other land uses that has caused land degradation, all route alternatives incorporate habitat units that would support a variety of faunal and floral species biodiversity to a greater or lesser extent – many of which are RDL and ODL. The proposed transmission lines will traverse the Magaliesberg mountain range, which is a unique mountain range of great ecological, geological and cultural importance and value.

  Sensitive ecological features include:
  - All protected areas;
  - Rocky ridges;
  - Wetlands, aquatic habitat and riparian areas;
  - Areas that have retained natural ecological features and are not suffering degradation are considered ecologically sensitive.

  o Impacts to avifauna from collision with the power line require specific attention, and the recommendations included in this report need to be implemented.

- Special care should be exercised to minimise traffic disruptions along the national, arterial, main and secondary roads.
- The project area consists of high topographic variation. This affords a high visual quality to the region, which needs to be taken into consideration during the final placement of the towers. The draft EMPr includes measures to impacts to the aesthetic value of the project area.
- From a socio-economic perspective, the management of impacts to landowners during the construction and operation phases need to be strictly controlled through the mitigation measures recommended by the specialist studies and the draft EMPr.
- Human and animal health risks associated with EMFs need to be closely monitored.

14.2 Environmental Impact Statement

With the selection of the BPEO for the transmission line route, the adoption of the mitigation measures included in the EIA Report and the dedicated implementation of the draft EMPr, it is believed that the significant environmental aspects and impact associated with this project can be suitably mitigated. With the aforementioned in mind, it can be concluded that there are no fatal flaws associated with the project and that authorisation can be issued, based on the findings of the specialists and the impact assessment, through the compliance with the identified environmental management provisions.

14.3 Key Recommendations

The following key recommendations accompany the EIA for the Anderson-Dinaledi 400kV transmission line:

- From the comparative analysis, the western route, western route – western deviation and the eastern route are preferred options to minimise impacts to the environment.
- It is recommended that Eastern route be chosen as the preferred alternative as the potential impacts that may rise can be mitigated against.

14.4 Conditions for Authorisation

The following conditions are regarded as critical mitigation measures emanating from the EIA:

- On-going communication with the affected landowners and during the implementation of the project.
- Prior to any construction, undertake necessary negotiations with directly affected landowners and establish requirements for access, fencing, game requirements, existing services, etc.
- Diligent compliance monitoring of the EMPr, environmental authorisation and other relevant environmental legislation by an Independent Environmental Control Officer (ECO) is crucial to ensure compliance with the stipulated management measures.

- Areas affected by construction activities need to be suitably stabilised due to the varying topography and watercourses within the project area. Suitable stormwater management measures are also required for access roads to manage erosion.
- Protected flora species are to be relocated prior to vegetation clearance, should avoidance not be possible. Permits need to be obtained under National Forests Act (Act No. 84 of 1998) if protected trees are to be cut, disturbed, damaged, destroyed or removed.
- A walk-down survey is to be undertaken, which includes the relevant environmental specialists, to determine the exact locations of the towers to ensure the safeguarding of sensitive environmental features within the corridor.
- The Construction EMPr must be updated to include the findings of the walk-down survey and should be submitted to DEA for approval.
- All access roads and construction camps need to be identified prior to construction and the final EMPr should make provision for suitable mitigation measures to manage these project components.
- Suitable fencing and access control required to protect farms.
- Strict security measures to be implemented.
- All relevant permits must be obtained prior to the commencement of construction activities or as deemed necessary.
- All recommendations and / mitigation measures made by the specialists must be adhered to for the preferred route chosen.

15 REFERENCES

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APPENDIX A: MAPS

1. LOCALITY MAP

2. GOOGLE EARTH MAP

APPENDIX B: DEA APPROVAL OF SCOPING REPORT

APPENDIX C: MINUTES OF MEETING HELD WITH DEA

APPENDIX D: SPECIALIST REPORTS

1. FAUNA, FLORA AND AVIFAUNAL IMPACT ASSESSMENT

2. INVERTEBRATE IMPACT ASSESSMENT

3. HERPETOLOGICAL IMPACT ASSESSMENT

4. VISUAL IMPACT ASSESSMENT

5. SOCIO-ECONOMIC IMPACT ASSESSMENT

6. HERITAGE IMPACT ASSESSMENT

7. AGRICULTURAL AND LAND CAPABILITY IMPACT ASSESSMENT

8. ELECTROMAGNETIC SURVEY

APPENDIX E: ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

APPENDIX F: SERVITUDE NEGOTIATION PROCESS

APPENDIX G: CURRICULA VITAE

APPENDIX H: COMMENTS RAISED BY I & APS

APPENDIX I: PROOF OF PUBLIC PARTICIPATION